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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/476,615	12/31/1999	MICHAEL S. CRONE	GE-W-192-CIP	8072

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EXAMINER	
BOYCE, ANDRE D	
ART UNIT	PAPER NUMBER
3623	

DATE MAILED: 08/29/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/476,615	CRONE, MICHAEL S.	
	Examiner	Art Unit	
	Andre Boyce	3623	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *31 December 1999* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-19* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-19* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *31 December 1999* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☒ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *4* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

1. Claims 1-19 have been examined. This Application is a CIP of USPN 6,154,735, which is a divisional of USPN 5,794,172, which is a divisional of USPN 5,623,413. However, the claimed matter is based upon new matter added in this application, therefore the priority date for the claims as stated is December 31, 1999, the filing date of this application.

Oath/Declaration

2. The oath or declaration is defective. A new oath or declaration in compliance with 37 CFR 1.67(a) identifying this application by application number and filing date is required. See MPEP §§ 602.01 and 602.02. The oath or declaration is defective because USPN 6,154,735 is not listed as being claimed for priority.

Drawings

3. Figure 2 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g).

4. A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Specification

5. The disclosure is objected to because of the following informalities: The related case information should be updated. Appropriate correction is required.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claims 1, 8-9, and 18 are rejected under 35 U.S.C. 102(b) as being anticipated by Matheson et al (USPN 5,623,413).

As per claim 1, Matheson et al disclose in a multiple move, simulated annealing method for resolving a scheduling problem associated with a plurality of orders for train resources, each order having a cost function and a scheduling window associated therewith (see column 19, lines 4-8), the improvement comprising the steps of: (a) establishing plural criteria (rules) for acceptance of a solution (see column 24, lines 1-6); (b) classifying (classification is based upon figure of merit, see column 6, lines 36-42) the scheduling problem; and (c) selecting the criteria for acceptance of a solution as a function of the classification of the scheduling problem (elimination of candidate solutions, based upon the set of rules, see column 24, lines 3-4).

As per claim 8, Matheson et al disclose in a multiple move, simulated annealing method for resolving a scheduling problem associated with a plurality of orders for train resources having an initial resource exception and a cost associated therewith by evaluating the resource exception and cost associated with each move during a search phase (see column 19, lines 4-8), the step of emphasizing cost over resource exception for a predetermined initial period of the search phase (see column 23, lines 8-10).

As per claim 9, Matheson et al disclose the initial period is a function of one of (1) a predetermined number of moves (see column 19, lines 37-41 where determining whether to use certain move operators, determines the number of moves) and (2) the value of the resource exception (see column 21, lines 10-13).

As per claim 18, Matheson et al disclose in a multiple move, simulated annealing method of solving a problem in the scheduling of train resources (see column 19, lines 4-8), the improvement comprising the step of reducing the level of acceptance of a solution in the evaluations of the results of early moves in order to preserve options for subsequent moves (see column 20, lines 44-51).

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

9. Claims 2-7, and 12-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Matheson et al (USPN 5,623,413), as applied to claims 1 and 8 above, in view of Libby (USPN 5,850,617).

As per claim 2, Matheson et al disclose (a) determining the total trip time associated with the plurality of orders (determined by the movement planner, based upon the trajectory of the train, see columns 13, lines 14-16 and 38-46); and (b) determining the total slack time associated with the plurality of orders (see column 26, lines 16-19, where the total time is calculated from slack percentage). Matheson et al does not explicitly disclose (c) determining the classification of the problem as a function of the total trip time and the slack time. Libby discloses classification (mission status) of the problem as a function of value, distance, and time (see column 9, table 2), along with associated threshold percentages of each. Further, Matheson et al disclose rule-based criteria that incorporate company policy, operating procedures, and experience factors, among others (see column 24, lines 4-6), wherein train operating procedures include total trip time and slack time, associated therein. Both Matheson et al and Libby are concerned with optimizing route planning via a cost function, therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to include determining the classification of the problem as a function of the total trip time and the slack time in the Matheson et al method, as seen in Libby, thereby providing further means for classifying the scheduling problem,

thus improving the computational efficiency (see Libby column 10, lines 21-26) of Matheson et al.

As per claims 3-5, Matheson et al does not explicitly disclose (a) selecting a predetermined percentage of total trip time to provide a threshold value; and (b) comparing slack time with the threshold value, and the selected percentage less than about one hundred percent and more than one hundred and fifty percent. Libby discloses trip time (mission time) based upon a threshold percentage (see column 9, lines 3-9) and comparing the percentage to the actual value, thereby assigning a higher priority to the parameter. Libby also discloses percentages that could include values less than one hundred and more than one hundred and fifty (see column 9, table 2). Further, both Matheson et al and Libby are concerned with optimizing route planning via a cost function, therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to include selecting a predetermined percentage of total trip time to provide a threshold value; and (b) comparing slack time with the threshold value, and the selected percentage less than about one hundred percent and more than one hundred and fifty percent, in Matheson et al, as seen in Libby, thereby providing further means for classifying the scheduling problem, thus improving the computational efficiency (see Libby column 10, lines 21-26) of Matheson et al.

As per claim 6, Matheson et al disclose (a) determining the total trip time associated with the plurality of orders (determined by the movement planner,

based upon the trajectory of the train, see columns 13, lines 14-16 and 38-46); (b) determining the resource exception associated with the plurality of orders (see column 21, lines 10-12); Matheson et al do not explicitly discloses (c) determining the classification of the problem as a function of the total trip time and the resource exception. Libby discloses classification (mission status) of the problem as a function of value, distance, and time (see column 9, table 2), along with associated threshold percentages of each. Further, Matheson et al disclose rule-based criteria that incorporate company policy, operating procedures, and experience factors, among others (see column 24, lines 4-6), wherein train operating procedures include total trip time and slack time, associated therein. Both Matheson et al and Libby are concerned with optimizing route planning via a cost function, therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to include determining the classification of the problem as a function of the total trip time and the resource exception in Matheson et al, as seen in Libby, thereby providing further means for classifying the scheduling problem, thus improving the computational efficiency (see Libby column 10, lines 21-26) of Matheson et al.

As per claim 7, Matheson et al does not disclose (a) selecting a predetermined percentage of total trip time to provide a threshold value; and (b) comparing resource exception with the threshold value. Libby discloses trip time (mission time) based upon a threshold percentage (see column 9, lines 3-

9) and comparing the percentage to the actual value, thereby assigning a higher priority to the parameter. Further, both Matheson et al and Libby are concerned with optimizing route planning via a cost function, therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to include selecting a predetermined percentage of total trip time to provide a threshold value; and (b) comparing resource exception with the threshold value, in Matheson et al, as seen in Libby, thereby providing further means for classifying the scheduling problem, thus improving the computational efficiency (see Libby column 10, lines 21-26) of Matheson et al.

As per claim 12, Matheson et al disclose the step of emphasizing cost includes the steps of: (a) classifying the scheduling problem (classification is based upon figure of merit, see column 6, lines 36-42); b) determining a maximum number of moves as a function of the classification of the scheduling problem (based on starting temperature and number of reduction steps, see column 19, lines 20-23); and (c) determining the initial resource exception associated with the scheduling problem (see column 21, lines 10-13). Matheson et al does not disclose (d) setting a threshold value as a predetermined percentage of the initial resource exception; and (e) emphasizing cost over resource exception until the first to occur of: (i) a reduction of the resource exception below the threshold value, and (ii) the maximum number of moves is reached. Matheson et al does disclose moves to satisfy the constraints and to obtain a lowest cost solution (see column 19, lines

4-8). Further, Libby discloses trip time (mission time) based upon a threshold percentage (see column 9, lines 3-9) and comparing the percentage to the actual value, thereby assigning a higher priority to the parameter. Further, both Matheson et al and Libby are concerned with optimizing route planning via a cost function, therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to include (d) setting a threshold value as a predetermined percentage of the initial resource exception; and (e) emphasizing cost over resource exception until the first to occur of: (i) a reduction of the resource exception below the threshold value, and (ii) the maximum number of moves is reached, in Matheson et al, as seen in Libby, thereby providing further means for classifying the scheduling problem, thus improving the computational efficiency (see Libby column 10, lines 21-26) of Matheson et al.

As per claim 13, Matheson et al disclose a method for resolving a scheduling problem associated with a plurality of orders for train resources by evaluating available moves in a simulated annealing process, each move resulting in a change in the resource exception associated with the problem and a change in cost associated with the move (see column 19, lines 4-8), comprising the steps of: (a) classifying the scheduling problem (see column 19, lines 4-8); and (b) making a random move (see column 19, lines 14-15). Matheson et al does not disclose (c) weighting the resource exception and cost factors associated with the random move with a scaling parameter related to

the classification of the problem; (d) evaluating the resource exception and the cost of the solution against a predetermined criteria; and g) accepting or rejecting the move based on the evaluation. However, Matheson et al does disclose weighing the resource exception and cost factors (see column 21, lines 10-13). Libby discloses the mission parameters (resources) compared to threshold values, which determine priority of the parameter against the cost solution, thereby determining acceptance of a potential move (see column 9, lines 3-11, 38-39, and 60-63). Further, both Matheson et al and Libby are concerned with optimizing route planning via a cost function, therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to include (c) weighting the resource exception and cost factors associated with the random move with a scaling parameter related to the classification of the problem; (d) evaluating the resource exception and the cost of the solution against a predetermined criteria; and g) accepting or rejecting the move based on the evaluation in Matheson et al, as seen in Libby, thereby providing further means for classifying the scheduling problem, thus improving the computational efficiency (see Libby column 10, lines 21-26) of Matheson et al.

As per claim 14, Matheson et al does not disclose the steps of: (a) determining a normalizing component of the scaling parameter as a function of the change in resource exception and cost from previous moves; (b) determining a target resource exception as a function of the number of previous

moves; and (c) determining a biasing component of the scaling parameter as a function of a comparison of the resource exception of the current move to the target resource exception. Libby discloses the mission parameters (resources) compared to threshold values, which determine priority of the parameter against the cost solution, thereby determining acceptance of a potential move (see column 9, lines 3-11 and 38-39). Further, Libby discloses a predefined margin, and the number of moves normalized against the predefined margin (see column 10, lines 7-18). Both Matheson et al and Libby are concerned with optimizing route planning via a cost function, therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to include the determination of the scaling parameter as seen above, in Matheson et al, as seen in Libby, thereby providing further means for classifying the scheduling problem, thus improving the computational efficiency (see Libby column 10, lines 21-26) of Matheson et al.

As per claims 15-16, Matheson et al does not disclose the predetermined criteria is the classification of the problem. Libby discloses the mission parameters (resources) compared to threshold values, which are the predetermined values determining classification (see table 2). Further, both Matheson et al and Libby are concerned with optimizing route planning via a cost function, therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to include the predetermined criteria as the classification of the problem, in Matheson et al, as seen in Libby,

thereby providing further means for classifying the scheduling problem, thus improving the computational efficiency (see Libby column 10, lines 21-26) of Matheson et al.

10. Claims 10-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Matheson et al (USPN 5,623,413), as applied to claims 8-9 above, in view of Cohn et al (USPN 5,745,735).

As per claims 10-11, Matheson et al does not explicitly disclose the initial period limited to about one hundred moves and limited to the time at which the value of the resource exception becomes less than about one percent. Cohn et al disclose the number of moves based upon the initial value of the localized temperature (see column 4, lines 37-47), which could be about one hundred. Cohn et al also discloses increasing the temperature until a predetermined percentage of moves are accepted (see column 4, lines 49-52). Both Matheson et al and Cohn et al relate to optimization by simulated annealing, therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to include the initial period limited to about one hundred moves and limited to the time at which the value of the resource exception becomes less than about one percent, in Matheson et al, as seen in Cohn et al, thus focusing the simulated annealing on more directed manner (see Matheson et al, column 19, lines 34-36).

11. Claims 17 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Matheson et al (USPN 5,623,413).

As per claim 17, Matheson et al disclose in a multiple move, simulated annealing method of scheduling train resources by considering the resource exception value and the cost associated with each of the moves (see column 19, lines 4-8). Matheson et al does not disclose the improvement comprising the step of limiting the total resource exception time to approximately one percent of the total unopposed trip time. However, Matheson et al disclose the resource exception being weighted as a function of other factors (see column 21, lines 10-13), therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to include limiting the total resource exception time to approximately one percent of the total unopposed trip time, in Matheson et, as a weighted constraint based upon trip time, thus allowing the energy function to focus on critical resources.

As per claim 19, Matheson et al does not disclose by evaluating the resource exception and cost associated with each move during a search phase, the steps of: (a) providing a target resource exception; and (b) weighting evaluations of the effects of subsequent moves on the resource exception and cost as a function of the departure of resource exception from the target. However, providing a target would be a logical progression, since Matheson et al disclose the resource exception being weighted as a function of other factors (see column 21, lines 10-13). Further, evaluation thereof is inherent in simulated

annealing techniques, therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to include (a) providing a target resource exception; and (b) weighting evaluations of the effects of subsequent moves on the resource exception and cost as a function of the departure of resource exception from the target, in Matheson et al thereby further focusing the optimization, and allowing the energy function to focus on critical resources.

Conclusion

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

-Shaefer (USPN 522192) discloses tokens taking on values that represent trial solutions.

-Lo (USPN 6125311) discloses a railway operation monitoring and diagnosing system.

-Cagen et al (USPN 5825660) disclose optimizing a three-dimensional component layout.

-Ferkinhoff et al (USPN 6115700) disclose providing an estimate of the state of a contact.

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andre Boyce whose telephone number is (703) 305-1867. The examiner can normally be reached on 9:30-6pm M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tariq Hafiz can be reached on (703) 305-9643. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 305-7687 for regular communications and After Final communications, and (703) 746-7305 for informal/draft communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-1113.

adb
August 23, 2002

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